

CLAIMS

We claim:

1. A planarization composition, comprising:
a structural constituent; and
5 a solvent system, wherein the solvent system is compatible with the structural constituent and lowers at least one of the intermolecular forces or surface forces components of the planarization composition.
2. The planarization composition of claim 1, wherein the structural constituent comprises a polymer.
- 10 3. The planarization composition of claim 2, wherein the polymer comprises a novolac-based polymer, a resol-type phenolic resin or a combination thereof.
4. The planarization composition of claim 1, wherein the solvent system comprises at least two solvents.
5. The planarization composition of claim 4, wherein the solvent system comprises an
15 alcohol-based solvent.
6. The planarization composition of claim 5, wherein the alcohol-based solvent comprises 1-propanol or 2-propanol.
7. The planarization composition of claim 4, wherein the solvent system comprises
20 propylene glycol methyl ether acetate (PGMEA), ethyl lactate, propylene glycol methyl ether, diethylene glycol, acetone or a combination thereof.
8. The planarization composition of claim 1, wherein the intermolecular forces component comprises hydrogen bonding interactions, electrostatic forces, steric forces, dipole-dipole interactions, dispersion forces, Van der Waals forces or combinations thereof.
- 25 9. The planarization composition of claim 1, wherein the planarization composition comprises an apparent viscosity.

10. The planarization composition of claim 9, wherein the surface forces component comprises an interfacial surface tension.
11. The planarization composition of claim 9, wherein the solvent system lowers the apparent viscosity by at least about 10%.
- 5 12. The planarization composition of claim 11, wherein the solvent system lowers the apparent viscosity by at least 30%.
13. The planarization composition of claim 10, wherein the solvent system lowers the interfacial surface tension by at least about 10%.
14. The planarization composition of claim 13, wherein the solvent system lowers the interfacial surface tension by at least about 20%.
- 10 15. The planarization composition of claim 1, wherein the composition further comprises a surfactant.
16. The planarization composition of claim 15, wherein the surfactant comprises at least one hydrocarbon-type surfactant, at least one fluorocarbon-type surfactant or a combination thereof.
- 15 17. The planarization composition of claim 16, wherein the at least one fluorocarbon-type surfactant comprises at least one fluoroaliphatic polymeric ester surfactant.
18. A planarization composition, comprising:
a cresol-based polymer compound; and
20 a solvent system comprising at least one alcohol and at least one ether acetate-based solvent.
19. The planarization composition of claim 18, wherein the cresol-based polymer compound comprises a novolac polymer.
20. The planarization composition of claim 18, wherein the at least one alcohol comprises
25 a branched alcohol.

21. The planarization composition of claim 20, wherein the branched alcohol comprises 2-propanol.
22. The planarization composition of claim 18, wherein the at least one ether acetate-based solvent comprises PGMEA.
- 5 23. The planarization composition of claim 18, wherein the composition further comprises a surfactant.
24. The planarization composition of claim 23, wherein the surfactant comprises at least one hydrocarbon-type surfactant, at least one fluorocarbon-type surfactant or a combination thereof.
- 10 25. The planarization composition of claim 24, wherein the at least one fluorocarbon-type surfactant comprises at least one fluoroaliphatic polymeric ester surfactant.
26. A film comprising the planarization composition of one of claims 1 or 18, wherein at least some of the solvent system is removed.
27. A film comprising the planarization composition of one of claims 15 or 23, wherein at
15 least some of the solvent system is removed.
28. A layered component, comprising:
a substrate having a surface topography; and
a planarization composition of claim 1, wherein the composition is coupled to the substrate.
- 20 29. The layered component of claim 28, further comprising at least one additional layer of material or film.
30. A layered component, comprising:
a substrate having a surface topography; and
a planarization composition of claim 18, wherein the composition is coupled to the
25 substrate.

31. The layered component of claim 30, further comprising at least one additional layer of material or film.
32. A layered component, comprising:
a substrate having a surface topography; and
5 a layer comprising the film of claim 26, wherein the layer is coupled to the substrate.
33. The layered component of claim 32, further comprising at least one additional layer of material or film.
34. A layered component, comprising:
10 a substrate having a surface topography; and
a layer comprising the film of claim 27, wherein the layer is coupled to the substrate.
35. The layered component of claim 34, further comprising at least one additional layer of material or film.
- 15 36. A method of forming a planarization composition, comprising:
providing a structural constituent;
providing a solvent system, wherein the solvent system is compatible with the
structural constituent and lowers at least one of the intermolecular forces or
surface forces components of the planarization composition; and
20 blending the structural constituent and the solvent system to form a planarization composition.
37. The method of claim 36, wherein providing the structural constituent comprises providing a polymer.
38. The method of claim 37, wherein the polymer comprises a novolac-based polymer, a
25 resol-type phenolic resin or a combination thereof.

39. The method of claim 36, wherein the solvent system comprises at least two solvents.
40. The method of claim 39, wherein the solvent system comprises an alcohol-based solvent.
41. The method of claim 38, wherein the alcohol-based solvent comprises 1-propanol or 2-propanol.
42. The method of claim 39, wherein the solvent system comprises propylene glycol methyl ether acetate (PGMEA), ethyl lactate, propylene glycol methyl ether, diethylene glycol, acetone or a combination thereof.
43. The method of claim 36, wherein the intermolecular forces component comprises hydrogen bonding interactions, electrostatic forces, steric forces, dipole-dipole interactions, dispersion forces, Van der Waals forces or combinations thereof.
44. The method of claim 36, wherein the surface forces component comprises an interfacial surface tension.
45. The method of claim 44, wherein the solvent system lowers the interfacial surface tension by at least about 10%.
46. The method of claim 45, wherein the solvent system lowers the interfacial surface tension by at least about 20%.
47. The method of claim 36, wherein the planarization composition comprises an apparent viscosity.
48. The method of claim 47, wherein the solvent system lowers the apparent viscosity by at least about 10%.
49. The method of claim 48, wherein the solvent system lowers the apparent viscosity by at least 30%.
50. The method of claim 36, wherein the composition further comprises a surfactant.
51. The method of claim 50, wherein the surfactant comprises at least one hydrocarbon-type surfactant, at least one fluorocarbon-type surfactant or a combination thereof.

52. The method of claim 51, wherein the at least one fluorocarbon-type surfactant comprises at least one fluoroaliphatic polymeric ester surfactant.
53. A method of forming a film, comprising:
providing the planarization composition of claim 1; and
5 evaporating at least part of the solvent system to form a film.
54. The method of claim 53, wherein evaporating at least part of the solvent system comprises applying a continuous source to the planarization composition.
55. The method of claim 54, wherein the continuous source comprises a heat source.
56. The method of claim 55, wherein the continuous source comprises an infrared source,
10 an ultraviolet source, an electron-beam source and combinations thereof.
57. A planarization composition, comprising:
a structural constituent; and
a solvent system, wherein the solvent system is compatible with the structural
15 constituent and lowers at least one of the intermolecular forces or surface
forces components of the planarization composition and wherein the
polydispersity of the composition is less than about 2.5.
58. The planarization composition of claim 57, wherein the structural constituent comprises a polymer.
59. The planarization composition of claim 58, wherein the polymer comprises a novolac-
20 based polymer, a resol-type phenolic resin or a combination thereof.
60. The planarization composition of claim 57, wherein the solvent system comprises at least two solvents.
61. The planarization composition of claim 60, wherein the solvent system comprises an alcohol-based solvent.
- 25 62. The planarization composition of claim 61, wherein the alcohol-based solvent comprises 1-propanol or 2-propanol.

63. The planarization composition of claim 60, wherein the solvent system comprises propylene glycol methyl ether acetate (PGMEA), ethyl lactate, propylene glycol methyl ether, diethylene glycol, acetone or a combination thereof.
- 5 64. The planarization composition of claim 57, wherein the intermolecular forces component comprises hydrogen bonding interactions, electrostatic forces, steric forces, dipole-dipole interactions, dispersion forces, Van der Waals forces or combinations thereof.
65. The planarization composition of claim 57, wherein the surface forces component comprises an interfacial surface tension.
- 10 66. The planarization composition of claim 57, wherein the planarization composition comprises an apparent viscosity.
67. The planarization composition of claim 66, wherein the solvent system lowers the apparent viscosity by at least about 10%.
- 15 68. The planarization composition of claim 67, wherein the solvent system lowers the apparent viscosity by at least 30%.
69. The planarization composition of claim 65, wherein the solvent system lowers the interfacial surface tension by at least about 10%.
70. The planarization composition of claim 69, wherein the solvent system lowers the interfacial surface tension by at least about 20%.
- 20 72. The planarization composition of claim 57, wherein the composition further comprises a surfactant.
73. The planarization composition of claim 72, wherein the surfactant comprises at least one hydrocarbon-type surfactant, at least one fluorocarbon-type surfactant or a combination thereof.
- 25 74. The planarization composition of claim 73, wherein the at least one fluorocarbon-type surfactant comprises at least one fluoroaliphatic polymeric ester surfactant.

75. The planarization composition of claim 57, wherein the polydispersity is less than about 2.
76. The planarization composition of claim 75, wherein the polydispersity is less than about 1.5.

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